

Removal activities under the Article 6.4 mechanism

Otherlab response to information note

Otherlab is a thought leading early stage R&D lab in San Francisco dedicated to the engineering solutions around climate change mitigation. This includes renewable energy generation, the electrification of energy use, and carbon removal. Otherlab is focused on the nexus of food production and carbon removal with the understanding that even a small reduction in global farmland will enable us to stay below 1.5°C of warming, and that this has negative carbon removal costs, scales quickly, improves food security, restores natural habitat and biodiversity, and helps mitigate a sixth mass extinction. George Monbiot's "Regenesys, feeding the world without devouring the planet" details many of these arguments and provides a treasure trove of citable references. His suggested solution set is however largely limited to plant based diets and farm free precision fermentation of protein and fat directly from hydrogen. Otherlab is developing critical enabling technologies for ~3x yield and lower cost robotic farming, low-cost desalination for desert farming (Australia alone could feed the world), and moving farming offshore (underwater robotic anchoring and upwelling, less than 1% of the Earth's ocean could feed the world). Any of these solutions can scale in the needed time (there is precedent) and keep the Earth below 1.5°C of warming at negative effective carbon removal costs. All of the above solutions working together enable us to quickly and comprehensively save the planet while increasing global prosperity and even buying time to reduce emissions. Otherlab is also developing a mobile biorefinery technology that can convert biomass directly into fossil fuel equivalents at lower costs. Critically this enables revenue generation from natural habitat management that exceeds many crops, creating an economic incentive and increased income stream for transitioning farmers. Carbon removal is primarily a problem of competition between food production and natural habitat (we farm over half the world's productive land), integrated solutions are needed and this is likely to disrupt vulnerable carbon markets within the next few years.

Otherlab is grateful for the opportunity to provide feedback on the Article 6.4 Supervisory Body's [Information note on Removal activities under the Article 6.4 mechanism Version 04.0](#).

Otherlab's main concerns with the information note are as follows:

- 1) Greater clarity is needed on the definition of natural and engineered solutions. At some level, all solutions are effectively engineered and all solutions use natural mechanisms. A better definition of nature based carbon removal might be those approaches that store carbon in living ecosystems, including ocean and soil carbon, food production, and so forth, thereby specifically including co-benefits of natural habitat and biodiversity restoration. Not storing carbon in living ecosystems, or at least bioaccessible reservoirs, can be ethically problematic and carbon storage in living ecosystems should be valued far more highly than geological carbon storage, which is

currently not the case. Functional, as opposed to dysfunctional carbon markets should reflect the far greater intrinsic value of living ecosystem carbon reservoirs. Artificial carbon removal allows us to very expensively rebalance the Earth's carbon dioxide levels around a much lower proportion of natural habitat. We need to seriously question if this is the best solution to climate change that we can come up with. To be clear, many nature based carbon removal technologies are on a substantial cost reduction curve and have a direct pathway to negative carbon removal costs, direct air capture is not and does not (there is no paradox here).

2) MRV considerations epitomize the street light effect, a bias of searching where it is easiest to see. This distorts carbon markets in favor of overly simplified but more easily measured, reported, and verified solutions that are prohibitively expensive, do not scale to solve the problem, and have detrimental environmental impacts. High resolution MRV optimizes for the wrong thing, distracts and poisons financial and social capital, and has a net negative impact on mitigating climate change. Negative cost carbon removal does not require high resolution MRV, or even necessarily carbon markets, it does however require general support to overcome economic tipping points and to scale quickly. Instead of focusing on MRV we need to focus on diversifying food production and habitat restoration, with the objective of achieving carbon removal that is too cheap to meter. The ultimate intent of carbon removal was to save the environment and humanity, but we have become overly fixated on a lesser proxy metric that is more easily measured and have lost sight of what we actually care about - actually saving the environment and humanity. Carbon removal is a byproduct of saving the environment and humanity, not the other way around, cause and effect have been confused.

3) Artificial carbon removal permanence is environmentally destructive and fiscally difficult to comprehend - predicting even a decade or two into the future is usually hard and uncertain. Restoring global natural habitat beyond what it was prior to the invention of agriculture and feeding all the world's people with highly nutritious diets via an additional as opposed to substitutional anthropogenic carbon cycle, will likely require more carbon than all anthropogenic fossil fuel emissions to date. If we are to avert a sixth mass extinction and feed the world, which one might presume is an existential priority, then the carbon removal crisis might only last a few decades. Beyond this carbon removal solutions that do not utilize living ecosystems may even need to be reversed (decommissioning and reversal costs for permanent artificial carbon removal solutions should be priced into their costs). Inflicting the unintended consequences of artificial carbon removal permanence on future generations repeats the type of short term thinking and general hubris that caused the climate change problem in the first place. On a side note, within this context leakage is likely a net positive that should be actively encouraged, as it gives the planet time to naturally heal and rebalance itself.

4) To a certain extent, everything is geoengineering and we first started substantially impacting the climate with the rise of agriculture some 12,000 years ago. Geoengineering is an uncontrolled experiment on the entire planet on which we all depend for our existence. Our

presence causes it and the future of the planet depends on us doing it, there is no going back. Extensive small-scale low-risk testing of a broad range of systems that have geoengineering implications is needed if we are to be adequately prepared for whatever future comes to be. We should also appreciate that while fossil fuel and agricultural emissions substantially increased climate change they also substantially increased the quality of life for billions of people. However there are a number of additional requirements we should consider imposing upon large scale geoengineering, of which artificial carbon removal is an overt example (that rarely meets the following set of additional requirements):

- a) Reversibility - there must be an easy undo button.
- b) Incrementally deployable - must be testable in small steps allowing safer scaling.
- c) Do no harm - it must not have substantial unmitigated downside effects.
- d) Do good - there should be independently justifiable and substantial additional environmental and/or humanitarian benefits to help mitigate any downside effects.
- e) Efficacy - it must have a substantial positive net benefit.
- f) Opportunity cost - it must be better than the alternatives. The downside risk of geoengineering means that all of the above type development should be avoided.

Good policy needs good science that defines the problem and good engineering that solves it. Unfortunately there has been a serious lack of the latter at the higher levels. Climate change is not a problem that can be solved in isolation by only optimizing for one metric. Policy needs to be informed by better engineering solutions and in turn be able to drive them.

We trust that our response can be of use to the Supervisory Body as it moves forward with its work. If there is any desire for elaboration and references for any of the above arguments and engineering details, please do not hesitate to reach out.

Yours sincerely,
Peter Lynn,
Senior Engineer,
Otherlab
pete@otherlab.com